Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Carriage of the Transmissions	)	CS Docket No. 98-120
Of Digital Television Broadcast Stations	)	
	)	
Amendments to Part 76 of the	)	
Commission's Rules	)	

TO: The Commission

REPLY COMMENTS OF PANASONIC/ MATSUSHITA ELECTRIC CORPORATION OF AMERICA

December 22, 1998

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SUMMARY

The recipe for the successful adoption of broadcast digital television ("DTV") is consumers' ability to purchase digital and digital-ready receivers, displays and set-top decoders with the functionalities they want, for the purposes they need and for what they decide is good value. Two ingredients are at work to permit this to happen. The first is the DTV transmission standard adopted by the Commission and the more detailed ATSC DTV standard that industry is rapidly implementing. The second is vigorous competition among consumer electronics manufacturers that will ensure a variety of consumer equipment to support both television—at standard resolution and high-definition levels—and the potentially limitless range of new, advanced services which the transmission standards make possible.

A third ingredient is needed, however, to help ensure that consumers have true choice and real and timely access to the full benefits of DTV. This ingredient is sufficient technical interoperability among media and consumer equipment, on a nationwide basis, to give confidence to both consumers and manufacturers.

The Commission can help provide this ingredient by continuing its pro-active approach to fostering technical compatibility between digital broadcast and cable media, and by pursuing the goal of portability in certain products for consumers' use with cable. Without clear and well-defined "build-to" compatibility-related standards, competitive digital retail products will be delayed and consumers' access to and enjoyment of DTV and new services through digital technologies will be thwarted. Therefore, Panasonic urges the Commission to continue and/or undertake the following efforts:

- Ensure that cable systems retransmitting broadcast DTV signals to digital receivers do so without degrading the quality of the original signals or limiting the utility of their captioning, V-chip, channel navigation, program guide information or other related material provided in the broadcast signal;

- Take steps to encourage the swift adoption of appropriate and consistent industry standards necessary to allow manufacturers to design and build cable-ready digital television receivers and truly portable digital cable set-top boxes both of which will promote the rapid growth of DTV;

- Seek to achieve interoperability standards among the distribution media and consumer electronics equipment quickly, by promoting open standards-setting processes, which themselves yield faster and more dependable results by involving all intended values from the outset;

- Reaffirm that there are several valuable interface standards, each desirable for its own particular capabilities, as no interface standard or any one user-community provides the solution to all compatibility issues; and,

- Help industry assess adequate content and copy protection standards by encouraging all parties at interest to participate in existing industry forums and standards bodies on this important subject.

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Matsushita Electric Corporation of America, d/b/a Panasonic ("Panasonic") files these reply comments to underscore the importance of approaching the transition to DTV in a way that promotes the interests of consumers. It is consumers—and the interest and confidence they express—who will determine whether the Nation achieves its goals of rapid conversion to DTV and public access to new, advanced and competitive services.

As numerous commenters recognize, consumers will be best served if the Commission helps ensure that: (i) the consumer electronics industry retains the flexibility to provide a range of products within a range of standards for connecting digital devices—thereby supporting a variety of features and price points; and (ii) all service providers are competitively neutral with respect to the functionality of consumers' digital equipment, the interoperability of cable and consumer electronics ("CE") equipment, and the content and copy control mechanisms to be implemented for DTV.

INTRODUCTION

Panasonic is the principal U.S. subsidiary of Matsushita Electric Industrial Co., Ltd., of Japan, a world leader in electronics. Overall, along with its subsidiaries and affiliates, Panasonic recorded sales of some $8 billion in the fiscal year that ended March 1998. Panasonic has over 50 operating companies in North America, including 24 manufacturing sites (U.S., Canada, Mexico, and Puerto Rico), that employ 23,000 people. Panasonic also has ten research laboratories and R&D units, as well as scores of sales and business operations offices throughout the United States.

Meeting customer needs is the basis of Panasonic's corporate philosophy. Reflecting the importance of this belief is the strong emphasis Panasonic places on achieving the highest standards of quality throughout its research, product development, manufacturing and after-sales customer care. The company's goal is to provide a steady stream of useful, convenient, accessible and user-friendly products.

PANASONIC AND DIGITAL TELEVISION

Panasonic is playing a substantial role, and has a significant interest in, the development of DTV, including high definition television ("HDTV"), and many other products and services made possible by DTV. Through its subsidiaries and affiliates, Panasonic already manufactures and markets sophisticated electronics products for consumers beyond today's NTSC televisions—including digital television decoders and conventional and digital displays, as well as digital video disc ("DVD") players, videocassette recorders ("VCRs"), audio products, and computers and computer peripherals—under the Panasonic, Technics and Quasar brand names. Panasonic also is a large, world-wide supplier of television production, recording, and signal processing equipment for the professional and commercial markets, including

broadcast, cable, satellite networks and distributors, television and film studios, and television stations and cable systems. The company also designs and manufacturers key semi-conductor and other components, which drive both consumer and professional equipment, as well as video and audio tape, optical discs, and other media for storing video, audio and data.

Panasonic is taking the industry lead in delivering the products necessary to bring the digital and HDTV revolution into American homes, schools and businesses. To do so, the company began its sizable design, development and manufacturing activities well before broadcast and cable media began to transmit digital signals. Beginning with the establishment, in 1980, of the Panasonic AVC American Laboratories ("PAVCAL") in Burlington, New Jersey, Panasonic has invested significant resources in the United States to bring consumers the highest quality, state-of-the-art advanced television and digital DTV products. Panasonic is proud to have contributed to the development of HDTV and DTV, initially with its own research, and as a member of the Advanced Television Systems Committee ("ATSC") and as a participant in the Commission's Advisory Committee on Advanced Television Service ("ACATS").

Panasonic began selling its first HDTV digital-ready television set in August 1998. The first such television product on the market.[1] Since November Panasonic has also been selling its all-format DTV decoder (TU-DST50).[2] Using technology developed by PAVCAL, this set-top box decodes and outputs all 18 video formats of the ATSC Digital Television Standard ("ATSC Standard"). It also converts through standard RF/antenna inputs

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[1] *See* Attachment A, Panasonic Press Release, August 3, 1998, "Panasonic Ships First High Definition Monitor/Projection TV." This equipment is cable-ready for today's analog cable systems.

[2] *See* Attachment B, Panasonic Press Release, October 22, 1998, "Panasonic Ships Industry's First Set-Top Digital TV Decoder."

any of the DTV formats into NTSC for connection to any existing NTSC set. And it is compatible with digital television sets from other manufacturers who provide the typical and standardized component video inputs. This DTV decoder also features full Dolby Digital AC-3 surround sound decoding, plus an IEEE-1394 digital interface connection which links the decoder to Panasonic's digital videocassette recorder ("D-VHS"), due on the market early next year. Paired with a range of Panasonic display options, such as the new digital- ready and HDTV-capable wide-screen projection TV (PT-56WXF90), or the digital-ready SuperFlat System TV (CT-32XF55), consumers will be able to enjoy the best possible home theatre experience.[3] Panasonic believes this "modular approach," as described in further detail below, will benefit consumers by providing flexibility and savings in this early stage of the transition from the analog to the digital era.

Panasonic also has developed compliant devices for providing DTV reception and display on computers and the company is working on a variety of applications in the computer and interactive television fields. Recognizing the importance of home networking, enhanced by the launch of DTV, Panasonic also is active in developing both standards and systems for home deployment.[4]

Panasonic believes that giving consumers the freedom to choose the type of functionality and interoperability they want in their digital audio and visual equipment is critical

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[3] *See* Attachment C, Panasonic Press Release, "Panasonic Leads in High Definition and Digital Television Products for the Home."

[4] *See* Attachment D, Panasonic Press Release, November 17, 1998, "Panasonic Highlights Home PC Connectivity With Its New MicroCast™ Wireless PC Multimedia Transceiver System;" Attachment E, Panasonic Press Release, November 9, 1998, "Panasonic and Compaq Co-Develop World's First High Definition Digital Television Tuner-Decoder for Personal Computers." In addition, Panasonic has joined with Microsoft to develop DTV reception cards for personal computers. *See* Attachment F, Panasonic Press Release, November 17, 1998, "Panasonic Demonstrates Integrated Digital TV Reception Card."

to market adoption of new products, the rapid nationwide transition to DTV, and the growth and vitality of competitive new services made possible by DTV. Over the past two decades, Panasonic has worked with accredited standards-setting bodies in an effort to develop open and transparent standards that serve consumers' interests in affordable, high-quality, full-featured digital and high-definition television equipment, as well as products for other services.

I. COMMENTERS CORRECTLY ENCOURAGE THE COMMISSION TO PROMOTE THE INTERESTS OF CONSUMERS.

As the majority of consumer equipment manufacturers recognize, consumer choice should guide the Commission's actions in this proceeding.[5] Panasonic urges the Commission to take steps in this proceeding to guarantee that consumers have choices in digital equipment, and the flexibility to make the transition to DTV in a manner that serves their own individual needs and budgets.

A. CONSUMERS SHOULD BE ABLE TO DISTINGUISH DIGITAL TELEVISION SETS BASED ON COST AND FUNCTIONALITY.

To help give consumers real choice and timely access to the benefits of DTV, Panasonic has implemented a modular approach in its early DTV sets. This approach equips the FCC- and ATSC-compliant digital set-top decoders with abundant features, including demodulation and full, all-format processing capabilities, for a relatively low retail price (currently $1,499 MSRP). As the digital transition unfolds, and new services emerge—such as data-enhanced TV, discrete data broadcasting, and other video and information services—more multi-featured products will become available to support them. Panasonic's modular approach will give consumers the flexibility to upgrade their systems by purchasing new DTV

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[5] *See e.g.*, Comments of the Consumers Electronics Manufacturers Association ("CEMA Comments"), p. 21.

components, rather than new integrated systems, which include the relatively costly display. At the same time, consumers' "old" DTV decoder can be used with an NTSC set in the home. In this way, Panasonic's set-top DTV decoders will benefit those consumers who choose not to purchase a DTV or HDTV set immediately, by providing an NTSC output that can be viewed on NTSC sets with many of the benefits of DTV (*i.e.* cleaner pictures, additional programming choices, etc.).

In addition to developing advanced DTV decoders, Panasonic is developing several types of digital television products to fit the different needs of consumers. Beginning in the Spring 1999, and continuing into the next year, Panasonic expects to roll out further display choices, including wide-screen, direct-view HDTV and SDTV monitors, and wide-screen, large-screen flat-panel plasma displays. And, as volume increases and prices fall, Panasonic will start providing fully integrated digital receivers, that offer a range of video resolution, audio and data capabilities.

Panasonic believes that a key to success with consumers, however, will be to offer cable-ready DTV sets. As discussed in more detail below, Panasonic is working with standards-setting bodies to define standards that will permit manufacturers to develop fully integrated digital receivers that can connect directly to cable systems without external cable set-top boxes.

B. CONSUMERS SHOULD BE ABLE TO COUNT ON THE FULL FUNCTIONALITY OF THEIR DIGITAL TELEVISION RECEIVERS.

It is vital, as several commenting parties emphasize, that digital broadcast programs be available to consumers who buy DTV-capable devices, in the full resolution quality with which they were originally broadcast.[6] In addition, when retransmitted broadcast signals carry enhancements and/or other related data, consumers should be able to receive such signals in their entirety. Cable systems, as the television transport mechanism to more than sixty-five percent of U.S. homes, should operate as conduits, not filters, when carrying broadcast DTV signals, thereby enabling consumers to have the full functionality of the television sets they choose to purchase.[7] This will allow consumers to enjoy the full benefits of the digital experience they expected from their investment in their DTV receivers. It also will benefit the public interest and the interests of all related media by fostering the growth and success of the digital transition.

1. The Commission Should Prohibit Digital Signal Degradation.

There are a number of ways in which cable transmission of broadcast DTV signals and other digital services might compromise the functionality of the digital receiver that consumers choose to purchase. One way is if a cable system were, without authorization from the broadcast source, to "scan-convert" an HDTV signal in one format to a different HDTV format, or to "down-convert" an HDTV signal standard-resolution image, altering the potential to display the TV program to the maximum potential on consumers' DTV sets.[8] Another

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[6] Comments of Circuit City Stores ("Circuit City Comments"), p. 6; CEMA Comments, p. 12.

[7] *See* Circuit City Comments, p. 6; Comments of Harris Corporation ("Harris Comments"), p. 7 (noting that the majority of consumers rely on cable to receive broadcast signals).

[8] CEMA Comments, pp. 12-13; Comments of Mitsubishi Electric America ("Mitsubishi Comments"), pp. 4-5.

potential impact on receiver functionality might be a change in the number of audio output channels accompanying a program.

While cable systems may desire to manage digital signals for efficiency reasons, the Commission should ensure that cable systems do not interfere with consumers' ability to view and hear digital signals in their original broadcast quality or at the highest quality that their DTV receiver permits. To do otherwise would enable cable systems, in effect, to disable fundamental features of consumers' new digital receivers, which would chill consumer demand for digital receivers and thwart the transition to DTV.

As several commenters emphasize, these problems can be avoided if cable systems are required to carry broadcast DTV signals to the digital television set (either directly or through a cable set-top box) without changing the video (or audio) in the digital stream.[9] This means that, in principle, cable systems would be able to remodulate a digital broadcast signal to another modulation standard simply for the purpose of retransmitting it so long as this process does not change the original quality of the broadcast video and audio. This approach would offer cable systems flexibility to carry digital broadcast streams via QAM modulation, for example, while preserving the original digital quality intended to be receivable by consumers so equipped. It also would provide consumers with access to all the benefits and services they expected to be available through digital television when they purchased their DTV equipment.

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[9] CEMA Comments, p. 12; Comments of Sony Electronics Inc. ("Sony Comments"), pp. 8-9.

2. The Commission Should Protect Channel Navigation.

Cable systems also should be precluded from limiting the effectiveness of the video and program-related information contained in the broadcast digital bitstream. An over-the-air digital signal contains not only audio and video transmissions, but also important closed-captioning intelligence and in-band, Program and System Information Protocol ("PSIP").[10] The PSIP portion of the digital signal also contains channel navigation instructions, V-chip information and on-screen program guide data. It is critically important that consumers can access this information, and Panasonic urges the Commission to protect the integrity of PSIP and to adopt the ATSC-recommended PSIP standard now before the Commission.

Although Panasonic's DTV sets are programmed to decode and process this information, cable systems presently are not required to transmit all of it to DTV receivers in a defined way that would enable DTV sets to function properly. For example, a cable system may strip part of the DTV signal. Or it may carry a DTV signal on a non-native frequency through the cable system, so that when the receiver looks for the DTV signal on its native frequency, it cannot tune the correct signal. In addition, the cable system might override the broadcast PSIP information with the cable system's own PSIP-type signaling—which is expected to be transmitted "out-of-band," that is, apart from its associated program channel.[11] However, there is no standard yet defined and, thus, no effective way for sets to decode out-of-band PSIP information. In addition, as NAB points out, this method would require television sets to employ additional capabilities and, thus, would create another hurdle to cable-ready DTV sets.[12]

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[10] *See* CEMA Comments, pp. 13-14 (describing contents of digital signals).

[11] *See* Comments of General Instrument Corporation ("GI Comments"), pp.5-6 (indicating its intent to carry PSIP information out of band).

[12] *See* Comments of the National Association of Broadcasters, Attach. G, pp. 12-13 (noting that

Failure of cable systems to pass through the broadcast PSIP information would jeopardize the ability of consumers to receive valuable program information, captioning, and V-chip code in the digital environment. Thus, Panasonic supports, and urges the Commission to adopt, the industry-recommend standard for PSIP crafted by ATSC and the Society of Cable Telecommunications Engineers ("SCTE"). Implementing the industry PSIP standard would better enable equipment manufacturers to develop digital equipment and bolster industry confidence in the future compatibility of potentially divergent digital standards.

Should the Commission permit out-of-band methods to provide navigational information, Panasonic urges the Commission to (i) require that cable systems transmit to the DTV set any and all the PSIP data contained in any digital broadcast signal without altering or limiting the effectiveness of that PSIP information; and (ii) mandate that PSIP be provided in an unscrambled, unencrypted form. In addition, the Commission should urge industry to adopt a single standard for out-of-band PSIP and other channel navigation information.[13] If cable systems employ these minimal efforts, consumer confusion and frustration would be eliminated, and reliance on new cable set-top boxes would be reduced. It would also advance the cable-ready solution for DTV, which has become so popular in the majority of households with cable today.

"out-of-band" transmissions would raise the costs of DTV sets and navigation devices).

[13] For example, if set manufacturers knew that cable's PSIP information would always be carried on a specific frequency by all cable systems, they could build in the capability to decode this information more inexpensively.

3. The Commission Should Protect the Transmissions of Electronic Program Guides.

Panasonic and other equipment manufacturers often incorporate electronic program guide ("EPG") data in their receivers, set-top boxes and other equipment.[14] As commenters note, in the digital environment, EPG information data will play an important role in enabling consumers to navigate through a large universe of channels accurately and with minimal confusion.[15]

Many alternative providers will offer electronic guides in a data format, enabling the consumer equipment products to organize and present the information. In addition, cable systems may download and offer EPGs to their subscribers. Panasonic supports both types of EPG formats, but urges the Commission to encourage industry participants to develop EPG standards so that equipment manufacturers can more readily and inexpensively design consumer electronics products for a nationwide-market. In addition, Panasonic supports the views expressed by other commenters that, in the interests of preserving competition and consumer choice, cable systems should be precluded from altering or deleting EPG information in the broadcast digital signal.[16]

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[14] *See e.g.*, Comments of Zenith Electronics Corporation ("Zenith Comments"), p. 10.

[15] Comments of the Association for Maximum Service Television ("MSTV Comments"), p. 35; Comments of Gemstar International Group Ltd. and Starsight Telecast, Inc. ("G/S Comments"), p. 7. *See also* E. Shapiro, "NBC and Gemstar sign Broad Pact on Program Guide," Wall Street Journal (July 16, 1998) ("As the world of 500 channels becomes more of a reality, guides that help viewers to easily choose between the channels are viewed as critical.").

[16] Panasonic supports adopting a cable EPG non-discrimination requirement outlined by MSTV. *See* MSTV Comments, pp. 36-37.

C. CONSUMERS SHOULD HAVE THE ABILITY TO NAVIGATE SEAMLESSLY AMONG DIFFERENT TYPES OF DIGITAL MEDIA AND EQUIPMENT.

Consumers are best served if their cable and television equipment can communicate with each other in ways that are transparent to the viewer. As several commenting parties recognize, the interplay between DTV transmissions, cable television distribution and television receivers is critical to achieve this result.[17] Although few commenting parties focus on the issue, Panasonic also urges the Commission to recognize the importance of, and seek to foster, consumers' ability to navigate seamlessly among different types of digital media, including broadcast, cable, satellite and other sources of programming and services, as well as a variety of digital products, including VCRs, DVD players and recorders, game machines, and computers.

The predicate to seamless navigation is operating protocols and technical standards that foster such a goal. Until there is a commonality of standards, Panasonic plans to provide multiple input mode switches in its digital receivers that can be activated from remote control devices (a "universal remote"). Although these input modes will help the consumer to access multiple sources of analog and of digital TV, they are only a temporary fix to a problem that needs a industry-wide long-term solution. If there is no structural compatibility among security, copy protection and navigation and transmission protocols, reliance on a universal remote will merely *simulate* compatibility. It will place tremendous (and expensive) burdens on the TV set or digital set-top boxes which the remote activates; it will require the consumer to purchase redundant equipment; and, it will reduce the functionality built into a cable set-top or DTV decoder box if a bypass of that box is required to access a given transmission.

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[17] Circuit City Comments, p. 7; CEMA Comments, p. 18. *See also* Notice, ¶ 17.

By sending a clear signal that the standards adopted by the cable and consumer equipment manufacturing industries must be open, the Commission will expedite true compatibility among various technologies, which is the first step toward nationwide portability. Indeed, Panasonic believes that it is possible to achieve portability of retail cable products for a core set of features, such as retransmission of broadcast DTV, and even some premium services, including pay-per-view and impulse pay-per-view, near video-on demand or video-on-demand services. The rapid development of a vibrant consumer market in widely compatible and portable digital navigation devices, in turn, would accelerate the penetration of DTV and, thus, the return of analog channels for other uses.[18]

II. THE COMMISSION SHOULD FACILITATE OPEN STANDARDS-SETTING PROCESSES AND THE INTRODUCTION OF CABLE-READY DTV SETS.

As addressed above, the Commission can and should play a critical role in ensuring that consumers have the opportunity to realize the benefits of a rapid and smooth rollout of DTV equipment and services. To fulfill this role, the Commission should send a clear signal that the standards adopted by the cable and consumer equipment manufacturing industries should be open, transparent, and reflect the consumer's interest in affordable, multi-function products. Conveying this message in this proceeding, by taking the following recommended steps, will help facilitate a truly competitive market in DTV equipment.

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[18] National portability and interoperability were among the goals of Section 629 of the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996) (codified at 47 U.S.C. § 549) (requiring the Commission to adopt rules to ensure the commercial availability of navigation devices for multichannel video program distributors).

A. STANDARD-SETTING PROCESSES SHOULD BE OPEN TO PARTICIPATION BY ALL INTERESTED PARTIES.

Several commenting parties correctly emphasize the need for industry-wide compatibility standards to be developed and negotiated through an officially recognized, standards setting body, with open participation by all affected industries.[19] As the Commission recognized a few years ago, "[s]tandards will be needed to ensure that compatibility is maintained as new digital cable technologies and services are introduced."[20] Panasonic urges the Commission, in this proceeding, to reaffirm its commitment to such standards and provide oversight to ensure that the cable and consumer equipment industries release appropriate "build-to" specifications on a rapid timetable. This will help equipment manufacturers develop efficient and "smart" DTV equipment.[21]

In the 1992 Cable Act, Congress directed the Commission to craft regulations to ensure consumer access to competitively provided consumer electronics equipment.[22] As CEMA notes in its comments, in response to this mandate, the Commission asked CEMA and the National Cable Television Association ("NCTA") to form an advisory group that would represent both industries and would jointly advise the Commission on these issues.[23] The two

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19 *See e.g.,* CEMA Comments, pp. 20-21.

20 See Compatibility R&O, 9 FCC Rcd at 1982.

21 Currently, as many commenters recognize, there exist effectively many cable transmission standards. While most in the cable industry seem to have selected QAM as the preferred digital transmission mode, there are divergent specifications and different transport layer definitions for QAM. These divergences create the same effect that using different file formats does in the computer environment. By contrast, broadcast signals are being transmitted according to the ATSC standards and protocols, which permit equipment manufactures to build digital sets with various functionalities, yet with confidence that those sets will receive the broadcast signals without a hitch.

22 *See* Section 17 of the Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460 (codified at 47 U.S.C. §624A).

23 *See* CEMA Comments, p. 20; see also Implementation of Section 17 of the Cable Television Consumer and Protection Act of 1992, Compatibility Between Cable Systems and Consumer Electronics Equipment, First Report and Order, 9 FCC Rcd 1981 (1994) ("Compatibility R&O").

associations formed the Cable Consumer Electronics Advisory Group ("C3AG"). From its inception, the members of C3AG—which include representatives from the content, cable and equipment manufacturing industries, among others—have been committed to developing effective, long-term solutions to technical compatibility problems associated with set-top boxes, and to reducing the cost and complexity of consumer equipment.[24]

C3AG's open process, broad representation, and official standing in relation to the Commission's "cable compatibility" mandate from Congress, make it the appropriate body to take the lead in developing proposed compatibility standards. These proposed standards can then be submitted to EIA, the relevant, accredited standards setting body, for prompt approval. Panasonic supports those comments that highlight the importance of C3AG and urges the Commission to look to C3AG for addressing necessary cable-CE interoperability matters.

Some commenters urge the Commission to rely on the OpenCable specifications process of Cable Television Laboratories, Inc. ("CableLabs"), a cable industry research and development organization, to resolve compatibility issues.[25] Panasonic applauds the cable industry for addressing cable specifications for cable's digital television and other services; and Panasonic participates in the OpenCable process as a vendor. Although it is a useful process, it is not truly open to all interested parties, and it is not a standards-setting body. Without the full and open participation of all interested parties at the outset, any of its preferred solutions to interoperability issues must then also be vetted by accredited standards bodies, which in turn takes more time.

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[24] For example, C3AG has been involved in the development of the National Renewable Security Standard ("NRSS"), which is working toward a standard that will facilitate the separation of security and non-security functionality in the digital environment.

[25] *See* Comments of Home Box Officer/Turner Broadcasting System, Inc., pp. 32-33.

Although Panasonic, like many commenters, prefers voluntary industry standards-setting processes, there is a clear need for the Commission to become involved to help ensure that voluntary, cooperative efforts succeed in a timely fashion. The Commission can do this formally by calling on NCTA and CEMA to report to the Commission and to set a schedule for completing cable-ready DTV and other recommended standards for services that may be incorporated into digital television sets. This is the best means of assuring that consumers will be able to benefit from the digital experience, and that they have access to a competitive and diverse market for compatible and portable DTV equipment.

B. THE COMMISSION SHOULD REAFFIRM THAT THERE ARE SEVERAL VALUABLE INTERFACE STANDARDS.

As several commenters recognize, the best solution to the interoperability problems created by lack of conformance between cable and broadcast transmission standards is cable-ready digital receivers.[26] Until cable-ready receivers can be developed, however, Panasonic is working with industry groups to establish common interface standards so that Panasonic's digital receivers are capable of connecting to other digital devices, including cable set-top boxes.

There are already a number of fairly inexpensive and effective ways to transmit digital signals to DTV sets that have been standardized, even before a digital cable-ready conversion has been agreed.[27] As CEMA explains, these options may be summarized as follows:

> • **Pass through.** Cable systems effectively retransmit the digital broadcast signal without alteration and "bypass" any processing in the cable set-top box for processing in the DTV receiver.

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26 *See e.g.*, CEMA Comments, pp. 18-19.

27 *See* CEMA Comments, pp. 21-23; Harris Comments, pp. 7-8; Circuit City Comments, p. 9.

• **Remodulation**. Cable systems could convert the digital broadcast signal's 8-VSB modulation either to 64-QAM or 256-QAM for carriage on the cable, and then translate the signal back to 8-VSB in the cable set-top box for input to the DTV receiver, using the remodulation interface standard EIA-762.

• **Component Video**. Cable systems could convert the DTV broadcast signal, however modulated, to a component video signal at the output of the cable set-top box, for input into the DTV receiver using the component video output EIA-770.

• **IEEE 1394**. Cable set-top boxes can use an IEEE 1394 output, which creates a 2-way digital bus architecture with the DTV receiver.[28]

Panasonic agrees with those commenters that advise the Commission to tread cautiously before concluding that IEEE 1394 is the optimal solution to any and/or all compatibility problems. Although it is useful for many applications, IEEE 1394 is not optimal for some situations. Indeed, in the digital world, as in the analog environment, there will be a market for both large and small screen DTV products, and both full-featured and limited purpose products, which will have different interface needs. The Commission should encourage the broadest and most competitive market for digital equipment that will fit the needs of all consumers, and facilitate marketplace solutions for digital compatibility problems and interface standards.

C. THE COMMISSION SHOULD ENCOURAGE ADEQUATE COPY PROTECTION IN THE DIGITAL ENVIRONMENT.

Panasonic is committed to working together with other consumer electronics manufacturers and with representatives of the content industry and other interested parties, to ensure that content is adequately protected whether it is transmitted in analog or digital

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[28] *See* September 16, 1998 Letter from MSTV to The Honorable Williams E. Kennard (noting that there are several technical standards in addition to IEEE-1394 that must be harmonized and/or agreed upon).

formats.[29] Panasonic has played, and continues to play, a leading role in developing, testing and implementing new technologies—such as the Digital Transmission Copy Protection ("DTCP") and IEEE 1394 compliant copy protection technology—that effectively prevent unauthorized access to and reproduction of content.[30] We believe strongly that cooperative multi-industry efforts are the best way to achieve the dual goals of allowing new technologies to emerge that give consumers additional service options, while still giving content distributors the ability to protect their works in order to preserve the economic incentives to release their works in new media.

The Five Company ("5C") group has developed the technical specifications necessary to implement copy control technology for movies and other works that may be transmitted using IEEE 1394 and similar bi-directional interfaces and it has negotiated the corporate documents and licensing agreements needed to establish the related licensing entity. It also has obtained the required export approvals from the Japanese and United States governments that will enable the technology to be used throughout the world. Panasonic has been working as part of the 5C group (which also includes Hitachi, Intel, Sony and Toshiba) to develop copy control specifications for the IEEE 1394 interface.[31] Panasonic urges the Commission to review the separate reply comments of the 5C group, which addresses facts

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[29] CEMA Comments, pp. 23-24; Mitsubishi Comments, pp. 2-3.

[30] *See* Attachment G, December 4, 1998, Panasonic Press Release, "Matsushita Develops IEEE Single Chip LSI Supporting DTCP." The DTCP standard defines an encryption protocol that protects video and audio entertainment content from illegal copying, theft or tampering during transmission via high-speed serial buses using IEEE 1394.

[31] *See* Comments of Hitachi, Ltd., Intel Corporation, Matsushita Electric Industrial Co., Ltd., Sony Corporation and Toshiba Corporation (providing information concerning the 5C DTCP technology).

about the 5C system, and the copyright, content protection and copy protection facets of DTV deployment, as well as the crucial recent legislative history on the subject.[32]

The technology developed by the 5C group has applications to the exciting areas of DVD and DTV, and Panasonic believes that industry forums and organizations, in which Panasonic and many other interested parties actively participate, are appropriately addressing this complex subject in a timely way.

D. THE COMMISSION SHOULD FACILITATE AND ENCOURAGE THE PRODUCTION OF CABLE-READY SETS.

Panasonic agrees with the majority of consumer equipment manufactures that the Commission should do everything it can to promote industry adoption of technical standards for cable-ready digital television receivers.[33] As these parties recognize, cable-ready sets will allow consumers to connect their cable service directly to digital television receivers, eliminating the need for duplicative circuitry, and reducing the cost and complexity of the digital equipment needed in the home. In addition, cable-ready sets enable equipment manufacturers, such as Panasonic, to offer consumers a wide array of features without risk that the cable set-top device will render them useless.

As several commenters noted, the consumer electronics industry, through the C3AG process, referred a proposal for a "cable ready" digital standard to NCTA.[34] Panasonic supports this proposal. Ultimately, equipment manufacturers and the cable industry will have to agree on and complete any standardization for at least the eight elements of the digital

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32 *See* Reply Comments of Hitachi, Ltd., Intel Corporation, Matsushita Electric Industrial Co., Ltd., Sony Corporation and Toshiba Corporation, filed December 21, 1998.

33 CEMA Comments, pp. 19-20; Mitsubishi Comments, pp. 3.

34 CEMA Comments, pp. 19-20 (noting that NCTA has yet to respond).

transmission and receiving functions, as outlined by CEMA, in order to achieve cable-ready sets.[35] In addition, for any premium or pay-type services with conditional access control which might ultimately be included, additional details must be completed—such as communications protocols, physical protocols, service protocols and reference documents—to build cable-ready digital sets. As noted in the CEMA letter, manufacturers are open to addressing these or any other matters that would affect design or manufacture of such sets.[36] It is unlikely that DTV cable-ready sets will be built until there is an understanding and agreement on the basic levels that can and may be built into them.

Cable-ready sets provide the best, long-term solution to the compatibility problems associated with set-top boxes and other digital devices. Currently, more than one-half of all cable subscribers access cable through cable-ready sets. The Commission should encourage industry players to adopt a definition of digital cable-ready so that the capabilities of digital cable-ready television sets are at least equivalent to what exists in today's analog world (*i.e.*, the definition should provide for reception of in-the-clear broadcast signals carried on cable

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[35] Specifically, CEMA states that digital cable-ready receivers and digital cable systems should: (1) Support ATSC Digital Television Standard A/53; which outlines the system characteristics of the U.S. Advanced Television System; (2) Follow RF performance recommendations per draft EIA-23, which defines tuner and corresponding cable signal characteristics; (3) Tune cable channels per EIA-542, which lists the frequencies to be used for each cable channel; (4) Use only 64/256 QAM modulation as specified in SCTE standard DVS-093 or 8 VSB and possibly 16 VSB modulation, as defined in ASTC A/53; (5) Support draft standard SCTE DVS-093, which defines the MPEG-2 packetization of program material; (6) Use only the transmission video display formats defined in ATSC standard A/53 table 3 and table 2 of SCTE standard DVS-033; (7) Use the "Program and System Information Protocol for Terrestrial Broadcast and Cable," SCTE Standard DVS-097, which defines the data format for tuning parameters, v-chip information and on-screen program guides; and, (8) Support emergency messaging.

[36] *See* also Letter from Gary Shapiro, CEMA to Chairman Kennard (Sept. 10, 1998) (outlining technical solutions to link cable set-top boxes to DTV receivers and listing essential elements for the interface between digital cable systems and digital receivers.).

and "basic cable" programs), so that new DTV sets are no less functional than NTSC sets.[37] If the cable industry also agrees on some set of premium or pay cable services (*i.e.*, services that employ conditional access), then the cable-ready definition should also include standards for implementing Point of Deployment ("POD") modules. Panasonic objects to proposals that the Commission adopt the "one-connection" IEEE 1394 approach, which would require cable-ready sets to include more expensive and greater functionality than would likely ever be used by many consumers.

Panasonic believes that basic cable-ready digital receivers—like today's analog cable-ready sets—can be developed in a short time. If voluntary processes continue to be unsuccessful in formally adopting even this basic cable-ready digital technical standard, Panasonic urges the Commission to initiate a review of this matter next year.[38]

E. THE COMMISSION SHOULD FORBEAR FROM REQUIRING MINIMUM PERFORMANCE STANDARDS FOR DIGITAL RECEIVERS.

Equipment manufacturers uniformly observe, and Panasonic agrees, that government-mandated DTV receiver standards are unnecessary.[39] Vigorous competition in the marketplace provides the best assurance that digital receivers and equipment will perform to the DTV transmission standards adopted by the Commission and the industry-supported ATSC standards. Indeed, in the analog environment, an equipment manufacturer is not able to survive in the intensely competitive consumer electronics marketplace unless it offers consumers high-performance digital products. This will be even more true in the digital arena, where Panasonic

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37 *See* Time Warner Entertainment Company Recon. Petition, CS Dkt. No. 97-80 (Aug. 14, 1998).

38 Other commenters advocate this approach as well. *See* Thomson Comments, p. 3; Mitsubishi Comments, p. 4.

39 *See e.g.*, CEMA Comments, p. 25.

and other equipment manufacturers have invested considerable time and money developing revolutionary digital products and are working on digital technologies for future digital equipment. There is little question that the effect of market-driven competition in cost, quality and features will help make digital televisions as ubiquitous in American homes as analog television sets are today.

CONCLUSION

The comments submitted in this proceeding encourage the Commission to take action to ensure that the standards adopted by the cable and equipment manufacturing industries are open, transparent and focused on giving consumers access to a diverse array of digital products. In so doing, the Commission should recognize that a number of technical solutions exist that can respond to the compatibility issues raised in the *Notice,* but that the ultimate solution is the rapid development of standards that will facilitate the production of cable-ready digital television sets.

Respectfully submitted,

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PANASONIC SHIPS FIRST HIGH DEFINITION MONITOR/PROJECTION TV

New Widescreen TV Delivers Awesome Picture in NTSC And HDTV

SECAUCUS, NJ (August 3, 1998) — Panasonic Consumer Electronics Company (PCEC) will begin national distribution this week of its first HDTV television product, a 56-inch (diagonal) widescreen projection TV, model PT-56WXF90. One of the first HDTV consumer products to be brought to market, this new monitor will not only display the astounding clarity and detail of the new digital television broadcast format, but will enhance the picture quality of today's standard (NTSC) programming. (DTV broadcasts will commence in major U..S. markets this Fall.)

When paired with a DTV-certified set-top decoder, such as Panasonic's forthcoming TU-DST50, the TV can display both High Definition (HDTV) 1080 line-interlaced (1080i) and Standard Definition (SDTV) 480-line progressive (480p) and 480-line interlaced (480i) DTV formats. The television will also up-convert conventional NTSC analog signals to 480p, dramatically enhancing the picture quality of today's standard TV broadcasts. Its built-in progressive scan converter delivers remarkably sharp, detailed images without visible scan lines.

"While the PT-56WXF90 is our first television specifically designed for HDTV," says Bill Mannion, general manager of Panasonic's Television Division, "it's the ideal choice for consumers who wish to enjoy the best quality NTSC, as well as the total digital television experience.

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"Even standard NTSC signals are remarkably enhanced due to advanced digital technology, " says Mannion. "Features like the 3D-Y/C digital comb filter and built-in digital special effects make this high-performance set the ultimate home theater viewing platform. "

A companion DTV-certified set-top decoder debuts in October. Also planned for introduction this fall is new SuperFlat™ System 32-inch (diagonal) SDTV-compatible monitor/receiver and a D-VHS VCR — a combination digital and analog VCR.

"The PT-56WXF90 is a key component in Panasonic's digital television strategy. Our DTV components allow consumers the flexibility of gradually upgrading their home theater systems to the digital format without losing any of the benefits of today's technology," Mannion states.

THE "BIG PICTURE"... IN STUNNING DETAIL

The PT-56WXF90 projects dazzling, intricately detailed images onto a fine-pitch (0.72mm), 56-inch diagonal screen. The screen's 16:9 aspect ratio is consistent with the widescreen HDTV broadcast standard. A built-in protective screen shield helps prevent screen surface nicks and scratches.

Component video inputs, designed to accept signals from digital video sources, separate the signals into their luminance (Y) and two color-difference (chrominance) elements. The result is exceptional picture detail and color accuracy.

The PT-56WXF90 utilizes highly accurate digital convergence of the red, blue and green images that comprise a TV picture. A total of 165 points are converged on the screen, creating a sharp, focused image.

Further enhancing the picture are a 3D-Y/C (luminance/chrominance) digital comb filter for clean color separation in the NTSC mode, velocity modulated scan for sharp transitions from black to white, and horizontal and vertical edge correction, to help produce clean, crisp images. The projection television is capable of delivering 850 lines of horizontal resolution (NTSC).

DIGITAL SPECIAL EFFECTS

This set has several features to make viewing more convenient, including some unique functions. For example, you don't have to miss portions of your TV program

even if you leave the room — the Catch-Up feature will store audio and a series of video still pictures of a program in progress during your absence. When you return, the TV will play back the captured still pictures, with recorded audio, until they catch up with the program in progress. The TV then automatically switches back to the regular viewing mode. "Tortoise" and "hare" icons indicate the progress of the catch-up feature on the screen. In addition, a Memo Function allows you to save up to 6 current screen images for viewing at a later time. You can display all 6 images simultaneously or individually, on the right half of the TV screen.

The two-tuner Picture-In-Picture feature allows an expanded view of two channels simultaneously, without the need to turn on a VCR or other tuner source. Unlike traditional P-I-P, which squeezes the second picture into an inset box, this set's 16:9 configuration allows two 4:3 images to be displayed side by side, filling the screen.

This intelligent TV features four display modes to accommodate the signal format and your personal viewing preference. The FULL mode displays panoramic 16:9 images; the 4:3 mode places an NTSC image in the center of the screen; the JUST mode will stretch (justify) the right and left edges of a 4:3 image to fill the entire screen; the ZOOM mode allows you to enlarge the picture uniformly to full-screen width, and then reposition the picture vertically.

CONVENIENCE FEATURES

Panasonic's new Roller Guide Menu lets users select the features they want without icons obscuring the screen. Individual feature graphics appear on a "roller" on the left side of the screen. Sub-menus are presented on a semi-transparent background for uninterrupted television viewing.

Advanced Channel Search displays 6 channels simultaneously on the right half of the viewing screen while allowing you to view the current program on the left side of the screen. You can also program the 6-channel display to search through all available channels or through your "favorite channel" memory.

Other convenience features include Parental Guidance control, which allows parents to restrict viewing of objectionable channels; a sleep timer; dual on/off timers and a trilingual menu (English, French and Spanish). The included Director™ Home Theater remote control, with buttons that even light up in the dark, operates the

television and hundreds of other video and audio components (including satellite receivers, CD players/changers, A/V receivers and tape decks.) A new joystick-type control mechanism for up, down, right and left movement is intuitive and easy to use.

The PT-56WXF90 offers exceptional versatility when it comes to connecting other home theater components. Besides component video inputs, the television includes three sets of standard video inputs, two S-Video inputs and both fixed and variable audio outputs for home theater applications.

HOME THEATER AUDIO

The PT-56WXF90 provides impressive audio features as well. The built-in five-speaker sound system includes center channel input, so it can serve as the center channel speaker in a Dolby® Pro Logic or Dolby® Digital surround system. It's the optimum connection for enjoying those great movie soundtracks. With Artificial Intelligence Sound Level Control, the television automatically compensates for severe increases in volume.

Suggested retail price for the Panasonic PT-56WXF90 HD-compatible monitor is $5999.95.

Panasonic televisions are marketed in the United States by Panasonic Consumer Electronics Company (PCEC), a division of Matsushita Electric Corporation of America (MECA). MECA is the principal North American subsidiary of Matsushita Electric Industrial Co., Ltd., (MEI) of Japan, one of the world's largest producers of electronic and electric products for consumer, business and industrial use. (Consumers seeking more information on the company's products can call Panasonic's Customer Call Center at 800-211-PANA or access Panasonic's home page at www.panasonic.com. Media interested in Panasonic press releases can gain information via the Panasonic Web site or through *New Directions* Public Relations' toll-free fax-back system at 888-734-7490.)

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PANASONIC SHIPS INDUSTRY'S FIRST SET-TOP DIGITAL TV DECODER
Honored In Senate For Making DTV A Reality

SECAUCUS, NJ (October 22, 1998) - Panasonic Consumer Electronics Company today became the first company to ship set-top digital TV decoders which are capable of receiving, decoding and processing signals for the nation's new digital and high definition (HDTV) television broadcast system that is scheduled to start operations on November 1. The set-top digital TV decoder and Panasonic's HDTV-compatible 56" widescreen projection set combine to make a complete High Definition Television System.

"The first shipment of our DTV decoders (TU-DST50) is going primarily to broadcasters, who are preparing their new digital program service, and to retailers who have planned digital television events in conjunction with the start of broadcasting on November 1," said Bill Mannion, general manager of the company's Television and Network Systems Division. "We will also ship units to arrive at selected retailers for sale to consumers next week."

The shipments of the Panasonic DTV set-top boxes - which feature a suggested minimum retail price of $1499.95 -- culminate a more than 15-year development effort focusing on the company's digital television R&D operation, Burlington, NJ-based Panasonic AVC American Laboratories, its television manufacturing bases in San Diego, CA and Tijuana, its color picture tube-making operations in Troy, H, and Panasonic broadcast equipment and consumer sales divisions in locations around the country.

Last month, Senator Conrad Burns (Republican; MT), chairman of the Senate's Communications Subcommittee, saluted San Diego-based Dow Stereo/Video and Panasonic on the Senate floor for "successfully introducing HDTV to the consuming public," with the launch of HDTV-compatible, 56-inch Panasonic widescreen projection TV's. Senator Burns noted that, "Following years of development, which has enjoyed substantial support from Congress, HDTV is now a reality. The technology for the first commercial units was largely developed by Panasonic/USA in the San Diego area."

In addition to the all-format DTV-certified set-top box and 56-inch projection set, Panasonic's current line of digital TV products also features a 32-inch direct view DTV-compatible set, a 36-inch direct view DTV-compatible and an all-format digital VHS videocassette recorder.

Panasonic Consumer Electronics Company is a division of Secaucus, NJ-based Matsushita Electric Corporate of America, the principal North American subsidiary of Matsushita Electric Industrial Co., Ltd. **(NYSE: MC),** a global leader in developing and manufacturing electronics. In North America, Matsushita Electric operates 24 manufacturing sites and employs 21,000 people. For more information on Matsushita and Panasonic, visit our website at *www.panasonic.com*.

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PANASONIC LEADS IN HIGH DEFINITION AND DIGITAL TELEVISION PRODUCTS FOR THE HOME

With major television stations around the country set to begin broadcasting the new High Definition (HDTV) and other Digital Television (DTV) signals this fall, Panasonic Consumer Electronics Company (PCEC) is ready to help consumers enter the digital era with an entire range of home TV products including HDTV and DTV displays, a DTV-certified set-top decoder, and a digital VHS (D-VHS) videocassette recorder.

"We want consumers to know that digital television is real, it's here, and it will be brought to you by Panasonic," says Jeff Cove, vice president of PCEC corporate planning and strategic digital development. Backing up that claim, the company unveiled its lineup of next-generation DTV products, including:

- a 56" widescreen HDTV-compatible display/projection TV with a suggested retail price (SRP) of $5999.95
- an all-format DTV-certified set-top decoder with an SRP of $1,700
- a 32" direct view DTV-compatible SuperFlat System TV with an SRP of $1,799.95
- a 36" direct view DTV-compatible receiver/multi-scan monitor with an SRP of $3,199.95 and
- an all-format digital VHS (D-VHS) videocassette recorder with an anticipated SRP of under $1,000.

- more -

"Our aim is to give consumers more choices and quicker access to the benefits of HD and DTV," said Cove. "By offering a separate all-format DTV-certified set-top decoder and HD- and DTV-compatible displays, we can make the advantages of the new digital television system accessible to more consumers more quickly. Consumers who want the full HDTV experience this fall can purchase our HDTV-compatible television and DTV set-top decoder. Those who are comfortable with their existing televisions can begin to enjoy the new DTV programs with NTSC quality by adding the Panasonic DTV set-top decoder. And all can enjoy the benefits of the D-VHS VCR, which can record DTV programs -- when connected to the Panasonic DTV set-top decoder -- as well as standard non-digital programs.

"Panasonic has been a technology leader throughout the development of digital television," Cove said. "We are especially proud that Panasonic's DTV-certified set-top decoder, which can decode and format for display all of the standard SDTV and HDTV formats, was developed at Panasonic AVC American Laboratories in Burlington, NJ. This product is a key element in our strategy of giving consumers early access to the broadest range of programming possible. "

In line with this goal, the company began deliveries of its 56" HDTV-compatible projection TV to dealers in July, and expects to ship the DTV-certified decoder in October.

To educate consumers about the new technology, Panasonic will launch an aggressive multi-pronged advertising and promotion program to accompany the DTV roll-out this fall. In addition to traditional advertising channels, the program will make use of the Internet, in-store demonstrations, joint activities with retailers and broadcasters, and point-of-purchase displays to raise consumer awareness and understanding of DTV.

Panasonic television products are marketed in the United States by Panasonic Consumer Electronics Company (PCEC), a division of Matsushita Electric Corporation of America (MECA). MECA is the principal North American subsidiary of Matsushita Electric Industrial Co., Ltd. (NYSE:MC), one of the world's largest producers of electronic and electric products for consumer, business and industrial use. Prices are quoted in U.S. dollars.

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Panasonic Highlights Home PC Connectivity With Its New MicroCast™ Wireless PC Multimedia Transceiver System.

Demonstrates first consumer product based on new 5.7GHz wireless RF technology

LAS VEGAS, NV, (November 17, 1998) - Panasonic, one of the world's largest consumer electronics companies, today unveils its new 5.7GHz MicroCast System, a digital convergence appliance that allows home PCs to distribute and control PC-based interactive media and Internet content using a standard TV set.

By combining its world-leading experience in cordless telephone and audio/video technologies, Panasonic's MicroCast system enables consumers to control their PC remotely, using a keyboard, mouse, and joystick, from other rooms in the home.

State of The Art Wireless Technology.

The three-piece MicroCast system incorporates 5.7GHz RF technology, the newest and highest performance RF technology available to consumers today.

MicroCast's PC Transceiver captures both full screen and full motion video at resolutions up to SVGA (800x600) from your PC's video graphics system as well as stereo audio from your sound card, and transmits them to the companion MicroCast set-top A/V Receiver unit connected to your television, home entertainment center, or home theater system.

The included MicroCast Control Console gives you real-time wireless control of the PC and supports PS/2 mouse and keyboard interfaces, as well as analog joystick, game controller, or gamepads. Just about anything you can do at your PC you can do from your TV. It's that simple.

It's Your PC and Media. Where do you Want to Use it?

Because it can bring your PC media to other rooms of your house, MicroCast is great for CD-ROM games and learning, AOL and online services, audio CDs, watching DVD movies, catching up on e-mail and chat, enjoying webcast and streaming content, and watching Internet-enhanced broadcast programming. With a high-performance home PC serving as the home entertainment and information gateway, MicroCast's wireless technology lets families choose where they play, learn, communicate, get information, and listen to or view entertainment. And, MicroCast's built-in "Theater Mode" allows you to experience PC-based DVD movies or PC-based television broadcasts at high quality wirelessly on your current TV.

We Made It Simple

As a leading supplier of consumer electronics, Panasonic understands that even the best technology isn't right unless it's simple to use and reliable. MicroCast's simple, straightforward connections allow for setup similar to VCR, PC monitor, mouse, keyboard or PC audio system which are already familiar to many users. MicroCast doesn't require any special software or drivers to install and will work with most PC-compatible computers.

Compatible With The Future

The MicroCast System was designed to work with most current computers systems and grow as your family's computer needs grow and change. The MicroCast System is architected to both co-exist and complement a wide range of currently available and future home network appliances.

Panasonic has patents pending for its new MicroCast system. MicroCast is a trademark of Matsushita Electric corporation of America. Other trademarks belong to their respective owners.

Best known for its Panasonic brand products, Matsushita Electric Industrial Co., Ltd. (NYSE: *MC*), is a worldwide leader in the development and manufacture of digital electronics for the home, office and in between. Based in Osaka, Japan, it recorded sales of $59.8 billion last year. In North America, Matsushita Electric and its Panasonic subsidiaries and affiliates employ more than 21,000 people. For more information on Matsushita and Panasonic, visit the company's website at www.panasonic.com.

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FOR IMMEDIATE RELEASE

Panasonic and Compaq Co-Develop World's First High Definition Digital Television Tuner-Decoder for Personal Computers

SECAUCUS, NJ and HOUSTON, TX (November 9, 1998) – Panasonic and Compaq Computer Corporation (NYSE: CPQ), two names that represent technological leadership, today announced the world's first digital television (DTV) tuner-decoder for personal computers. The two-card device enables computers to receive, decode and display digital television signals on the screen of a PC. Broadcasts of High Definition and digital TV signals began in major markets around the country on November 1.

Compatible with all of the approved Advanced Television System Committee (ATSC) digital broadcast formats, plus the existing National Television Standards Committee (NTSC) analog format, the new PC-DTV device leverages the computing power already in the PC to provide an alternative digital TV solution. The device will be demonstrated at the Panasonic booth (L-1014) at Comdex '98 in the Las Vegas Convention Center from November 16-20.

Panasonic Industrial Co. will initially market the device on an OEM basis to manufacturers, broadcasters, content creation studios, content developers and others with a stake in the developing DTV industry. The device will be manufactured by Matsushita Electronics Components Co., Ltd.

"Panasonic has led in the development of digital television, both in systems for broadcasters as well as digital television products for the home," said Jukka Hamalainen, president of Burlington, NJ-based Panasonic AVC American Laboratories, Inc., the company's U.S. digital TV laboratory. "This digital television tuner-decoder is a result of a collaboration between two global technology innovators. Leveraging the expertise of Compaq enabled us to bring this product to the market in record time."

"It was truly an exchange of know-how," said Trey Smith, vice president, Advanced Technology, Consumer Products Group, Compaq Computer Corporation. "Panasonic clearly understood HDTV and we already had a proven PC/TV architecture. Together, we developed this innovative device that allows PCs to become, in effect, high-definition televisions. We are excited to be a part of the global rollout of HDTV and will continue to develop industry leading solutions that meet the ever-changing needs of our customers."

About Compaq

Compaq Computer Corporation is a Fortune Global 100 company. Compaq is the second largest computer company in the world and the largest global supplier of computer systems. Compaq develops and markets hardware, software, solutions, and services, including industry-leading enterprise computing solutions, fault-tolerant business-critical solutions, networking and communication products, commercial desktop and portable products and consumer PCs. The company is an industry leader in environmentally friendly programs and business practices.

Compaq products are sold and supported in more than 100 countries through a network of authorized Compaq marketing partners. Customer support and information about Compaq and its products are available at http://www.compaq.com.

About Panasonic

Best known in the U.S. for its Panasonic brand, Matsushita Electric Industrial Co., Ltd.(NYSE: MC) is a worldwide leader in the development and manufacture of digital electronics and electric products for the home, office and industry. It is based in Osaka, Japan, as is its subsidiary Matsushita Electronics Components Co., Ltd., which manufactured the new PC-DTV device. Based in Secaucus, NJ, Panasonic Industrial Co., a division of Matsushita Electric Corporation of America, is the sales and marketing channel for electronic components to customers in North America.

Panasonic's development of HDTV and digital television has been centered on Panasonic AVC American Laboratories, Inc. Based in Burlington, NJ, the company developed the world's first single-chip, all-format, digital television decoder, which is incorporated in the new PC-DTV decoder device. Panasonic Consumer Electronics Company launched the nation's first HDTV-compatible projection TV set in August and in October was the first company to announce shipments of Digital TV set-top tuner-decoders. For more information on Panasonic or Matsushita Electric, visit our web site at www.panasonic.com.

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Panasonic Demonstrates Integrated Digital TV Reception Card At COMDEX/Fall '98

First-Ever PC Add-On Card With DTV Tuner, MPEG-2 Decoder And PCI Interface Developed With Microsoft

LAS VEGAS - Nov. 17, 1998 - Panasonic will demonstrate a new integrated digital television (DTV) reception card for personal computers at the Panasonic booth (L1014) during COMDEX/Fall '98. This hardware technology, the next step in Panasonic's ongoing relationship with Microsoft Corp., is the first to integrate a DTV tuner, MPEG-2 video decoder and peripheral component interconnect (PCI) interface into a single PC add-on card.

The new single-board design, which was developed by the AVC Product Development Laboratory of Matsushita Electric Industrial Company Ltd. (MEI) in conjunction with Microsoft, is built on the Microsoft® Windows NT® operating system. The technology is based on the Microsoft and Intel PC99 specification and relies primarily on PC software technology to receive, process and display DTV signals. The card's software architecture conforms to the Microsoft DirectShow™ API and enables real-time MPEG-2 data streaming and control on Windows NT and, in the future, the Microsoft Windows® 2000 operating system.

Designed as a cost-effective PC-DTV solution, the DTV reception card will use the data-streaming feature of Microsoft DirectShow architecture to store, read and retrieve a variety of multimedia data. This new technology will enable PC users to immediately benefit from the DTV programming that U.S. broadcasters began to transmit at the beginning of November.

"This new integrated digital television reception card is just one tangible result of the close cooperation between Panasonic and Microsoft that began with the memorandum of understanding our two companies signed earlier this year," said Dr. Yoshitomi Nagaoka, director of MEI's AVC product development laboratory. "We expect that by continuing this collaboration we can develop even stronger, more competitive Panasonic digital products to meet the needs of our customers."

"Microsoft is pleased that cooperation between Microsoft and Matsushita Electric is enabling ongoing advancements in digital television technology," said Craig Mundie, senior vice president of the consumer platform division at Microsoft. "The integrated DTV tuner card for the PC demonstrates tangible ways in which the technologies of the personal computer and consumer electronics industries are converging to quickly deliver the availability of DTV features on a PC."

About Matsushita Electric

Best known for its Panasonic brand products, Matsushita Electric Industrial Company Ltd. (NYSE "MC") is a worldwide leader in the development and manufacture of digital electronics for the home, office and in between. Based in Osaka, Japan, it recorded sales of $59.8 billion last year. In North America, Matsushita Electric and its Panasonic subsidiaries and affiliates employ more than 21,000 people. The company's U.S. DTV laboratory, Panasonic AVC American Laboratories Inc. in Burlington, N.J., has been a leader in the transition to DTV. For more information on Matsushita and Panasonic, visit the company's Web site at http://www.panasonic.com.

About Microsoft

Founded in 1975, Microsoft (Nasdaq "MSFT") is the worldwide leader in software for personal computers. The company offers a wide range of products and services for business and personal use, each designed with the mission of making it easier and more enjoyable for people to take advantage of the full power of personal computing every day.

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Note to editors: If you are interested in viewing additional information about Microsoft, please visit the Microsoft Web page at http://www.microsoft.com/presspass/ on Microsoft's corporate information pages.

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MATSUSHITA DEVELOPS IEEE 1394 SINGLE CHIP LSI SUPPORTING DTCP

*** Conforming to the Digital Transmission Content Protection Standard***
Preliminary release to begin in March '99

TOKYO (December 4, 1998) – Matsushita Electric Industrial Co., Ltd. (MEI) and Matsushita Electronics Corporation (MEC) have jointly developed an IEEE 1394[1] single chip LSI (MN864501) conforming to the DTCP[2] digital transmission content protection standard. Preliminary release of samples will begin in March 1999 at a price of 3,000 yen.

Digital copying of information does not degrade video or sound quality. Thus, from the viewpoint of copyright protection, a solution to the content protection problem was required when AV equipment provides a digital interface like IEEE 1394. Conventional IEEE 1394 LSIs had no internal content protection circuits. Using the new LSI, digital AV equipment (such as digital broadcasting STB, digital TV and D-VHS) can easily comply with the DTCP standard content protection standard. DTCP-compliant AV equipment can be interconnected via digital cables without copy protection problems, for video and audio content of superior quality.

Main Features:

1. All the circuits necessary for content transmission following the DTCP content protection specification have been integrated onto a single chip.
2. Parallel processing offers high-speed operation of the encryption/decryption system.
3. The internal IEEE 1394 physical layer with two ports facilitates digital connections to multiple appliances.

- more -

The new IEEE 1394 interface LSI contains the following newly-developed LSIs:

1. Encryption/decryption system complying with the DTCP digital transmission content protection standard.
2. An MPEG2[3] data transmission protocol circuit.
3. An IEEE 1394 link layer[4] and physical layer[5]

Established in Osaka, Japan in 1918, Matsushita Electric Industrial Co., Ltd. is one of the world's leading producers of electronic and electric products for consumer, business and industrial use. Consolidated annual sales for the fiscal year ended March 31, 1998 reached a record 7,890.7 billion yen (US $59.78 billion). Matsushita has more than 275,000 employees worldwide, with overseas operations that include over 220 companies in 46 countries. Matsushita's products are marketed worldwide under the Panasonic, Technics, Quasar and National brand names.

Functions and Specifications:

- Link layer in compliance with IEEE 1394-1995
- Physical layer in compliance with IEEE 1394-1995, with transmission rates of 100/200 Mbps
- DTCP-compliant encryption/decryption
- Physical layer chips can be externally connected (Max S200).
- Supports MPEG2 transport stream

  Supported transmission rate: Max. 60.160 Mbps, Min. 1.504 Mbps

Process	CMOS 0.35 μm
Power supply voltage	3.3 $\pm$ 0.3 V (for I/O), 2.0 $\pm$ 0.2 V (inside)
Input frequency	24.576 MHz
Power consumption	145 mW (at Tx), 135 mW (at Rx)
Package	164-pin, 0.4-mm pitch, thin-type QFP package

Background:

The DTCP digital transmission content protection standard defines an encryption protocol that protects video and audio entertainment content from illegal coping, theft or tampering during transmission via high-speed serial buses using IEEE 1394. This specification is considered to be

the safest illegal copy protection system for current home appliances. DTCP specifies a mechanism that enables mutual authentication by content transmission equipment. This takes the form of checking that its partner is on the illegal equipment list, encrypting any transmission content that needs copy protection, and then transmitting it. By the spreading of this standard, content providers can distribute video and audio content of superior quality, and users can enjoy the content distributed.

Technical Contents:

1. Encryption/decryption system complying with the DTCP digital transmission content protection standard

   The system encrypts/decrypts using a block cypher. The encryption/decryption system has been developed and licensed by DTLA [6], the DTCP's licensing administrator.

2. An MPEG2 data transmission protocol circuit

   The circuit controls MPEG2 data timing, processes headers required for data transmission, etc. An MPEG2 interface can be easily connected to external LSIs because it can be synchronized with an internal or external clock.

3. IEEE 1394 link and physical layers

   Link and physical layers comply with IEEE 1394-1995 standards. The layers adopt the FireWire[7] technology developed by Apple Computer, Inc.

Feature Description:

1. All the circuits required for content transmission complying with the DTCP content protection standard have been integrated onto a single chip.

   An IEEE 1394 link and physical layers, an MPEG2 packet transmission protocol circuit and DTCP-compliant encryption/decryption have been integrated onto a single chip via a 0.35 μm CMOS process. This achieves miniaturization of appliances.

2. Parallel processing offers high-speed operation of encryption/decryption system.

   The encryption/decryption system has been thoroughly accelerated by use of parallel processing. At the transmission speed of 1.504 - 60.160 Mbps specified by MPEG2 data

transmission protocol, the optimal MPEG2 data transmission has become available.

3. The internal IEEE 1394 physical layer with two ports facilitates digital connections to multiple appliances.

   Since the product has a two-port physical layer of 100/200 Mbps in compliance with IEEE 1394-1995 standards, it can be connected to multiple appliances. Since standby setting is available for each port of the two-port physical layer, power consumption can be reduced. An external physical layer can also be connected without using the on-chip physical layer.

Definitions of Terms:

[1] IEEE 1394

IEEE 1394 is a high-speed serial bus standard provided by IEEE in 1995. It has characteristic features for multimedia data transmission, such as availability of 100/200/400 Mbps data transmission and Plug-and-Play.

[2] DTCP (Digital Transmission Content Protection)

An IEEE 1394-compliant copy protection technology proposed by 5 companies: Hitachi, Ltd., Intel Corporation, Matsushita Electric Industrial Co., Ltd., Sony Corporation, and Toshiba Corporation.

[3] MPEG2 (Moving Picture Experts Group Phase 2)

A moving picture compression standard provided by the International Standardization Organization in November 1994.

[4] Link layer

Transmits data to and from a transaction layer, its upper layer, allocates addresses, checks data validity, and divides data frames.

[5] Physical layer

Converts digital signals from a link layer to analog signals. Specifies not only the electrical interface but also the physical interface, such as cables and connectors.

[6] DTLA (Digital Transmission Licensing Administrator)

DTCP's licensing administrator.

[7] FireWire

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